



New records of *Pimpla* Fabricius, 1804 (Hymenoptera, Ichneumonidae, Pimplinae) from Brazilian northeast

German Antonio Villanueva-Bonilla¹, Diego Galvão de Pádua², Joberto Fernando Sobczak³

1 Universidade Estadual de Campinas, Postgraduate Program in Animal Biology, Institute of Biology, R. Monteiro Lobato 255, Cidade Universitária, Campinas, SP, 13083-970, Brazil. **2** Instituto Nacional de Pesquisas da Amazônia, Postgraduate Program in Entomology, Av. André Araújo 2936, Manaus, AM, 69067-375, Brazil. **3** Universidade da Integração Internacional da Lusofonia Afro-Brasileira, Institute of Exact and Natural Sciences, Laboratory of Ecology and Evolution, R. José Franco de Oliveira s/n, Redenção, CE, 62790-972, Brazil.

Corresponding author: German Antonio Villanueva Bonilla, germanvillanueva9@gmail.com

Abstract

We record for the first time the species *Pimpla croceiventris* (Cresson, 1868), *P. golbachii* (Porter, 1970), and *P. sumichrasti* Cresson, 1874, belonging to the Pimplini tribe (Ichneumonidae, Pimplinae), in northeastern Brazil. These species have been recorded in the south and southeast of Brazil, except for *P. croceiventris*, which has also been recorded in the north of the country. Regarding the development of larvae and its physiological characteristics, *Pimpla* Fabricius, 1804 is one of the most well-studied genera within ichneumonids. These new distribution records will contribute to the understanding of physiological tolerances in different habitats as well as discoveries of new parasitoid-host interactions in new environments.

Keywords

Biodiversity, Darwin wasps, idiobiont, parasitoid wasp, Pimplini, South America

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Introduction

Pimplinae is a very large subfamily of the Darwin wasps (Ichneumonidae) (Klopfstein et al. 2019). This group has 1,737 species described in 77 genera worldwide (Yu et al. 2016) and it is currently divided into three tribes (Delomeristini, Ephialtini and Pimplini), including predators of eggs, idiobiont ecto- and endoparasitoids, and koinobiont ectoparasitoids of several arthropods (Quicke 2015).

Pimpla Fabricius, 1804 is a relatively large genus of the tribe Pimplini, with 205 valid species (Yu et al. 2016).

Most species of this genus are idiobiont endoparasitoids mainly of lepidopteran prepupa or pupa (Ueno 1999; Quicke 2015; Yildiz and Ayberk 2019). Currently, this genus is represented by 10 species in Brazil: the species *Pimpla azteca* Cresson, 1874, *P. caerulea* Brullé, 1846, *P. golbachii* (Porter, 1970), *P. semirufa* Brullé, 1846, *P. sumichrasti* Cresson, 1874, *P. tomyris* Schrottky, 1902 and *P. trichroa* (Porter, 1970) are present in the south and southeast regions; *P. rufipes* Brullé, 1846, is only recorded in

the southeast region; *P. perssoni* Gauld, 1991 is present only in the south region; and *P. croceiventris* (Cresson, 1868) is the only one occurring in the southeast, south, and north of the country (Fernandes et al. 2020).

The degree of knowledge and sampling of various groups of invertebrates in the Northeast Region is severely insufficient when compared to other Brazilian regions (Brandão et al. 2000). The objective of this work is to provide the first known records of the species *P. sumichrasti* and *P. croceiventris* in the states of Ceará and Bahia, and of *P. golbachii* in the states of Rio Grande do Norte and Bahia. These data extend the geographical range of the genus *Pimpla* to the northeastern region of Brazil.

Methods

The species were determined through Porter's review (1970) for South American species of *Pimpla* (= *Coccygomimus* Saussure, 1892). The studied specimens are deposited at Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia, Manaus (INPA; curator: Marcio L. Oliveira), and Universidade Estadual de Feira de Santana, Bahia (UEFS; curator: Sérgio Andena).

Digital images were taken using a Leica DMC4500 digital camera attached to a Leica M205A stereomicroscope and combined by using the software Helicon Focus 5.3 Pro. All pictures were treated using Adobe Photoshop. The maps were finalized using SimpleMapp (Shorthouse 2010).

Results

Ichneumonidae
Pimplinae

Pimpla croceiventris (Cresson, 1868)

Figure 1A–D

Material examined. BRAZIL • 1 ♂; Ceará, Guaramiranga; 04°15'47"S, 038°54'47"W; Nov. 2018; Malaise trap; J.F. Sobczak leg.; INPA, CL0001. • 3 ♂♂; Bahia, Igrapiúna, Reserva Ecológica Michelin, Pacangê; 18 Nov.–16 Dec. 2012, Malaise trap; M. Aragão, E. Menezes, E. Mota and S. Andena leg.; UEFS, codes CL0002–CL0004.

Identification. According to Porter (1970) this species can be identified by the combination of the following characteristics: 1) head and mesosoma black; 2) metasoma reddish-brown; 3) subalar prominence yellowish white; 4) malar space 0.5–0.7 times as long as basal mandibular width; 5) laterotergites II–V narrow and inconspicuous, less than 0.2 times as long as wide; 6) clypeal margin weakly convex; and 7) female with ovipositor slightly depressed, upper valve bearing weak lateral denticles and with the valve not expanded laterally.

Distribution. Argentina, Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, and Venezuela (Yu et al. 2016).

Distribution in Brazil. Minas Gerais, Pará, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo (Fernandes et al. 2020), Bahia and Ceará (new records, Northeast Region) (Fig. 2).

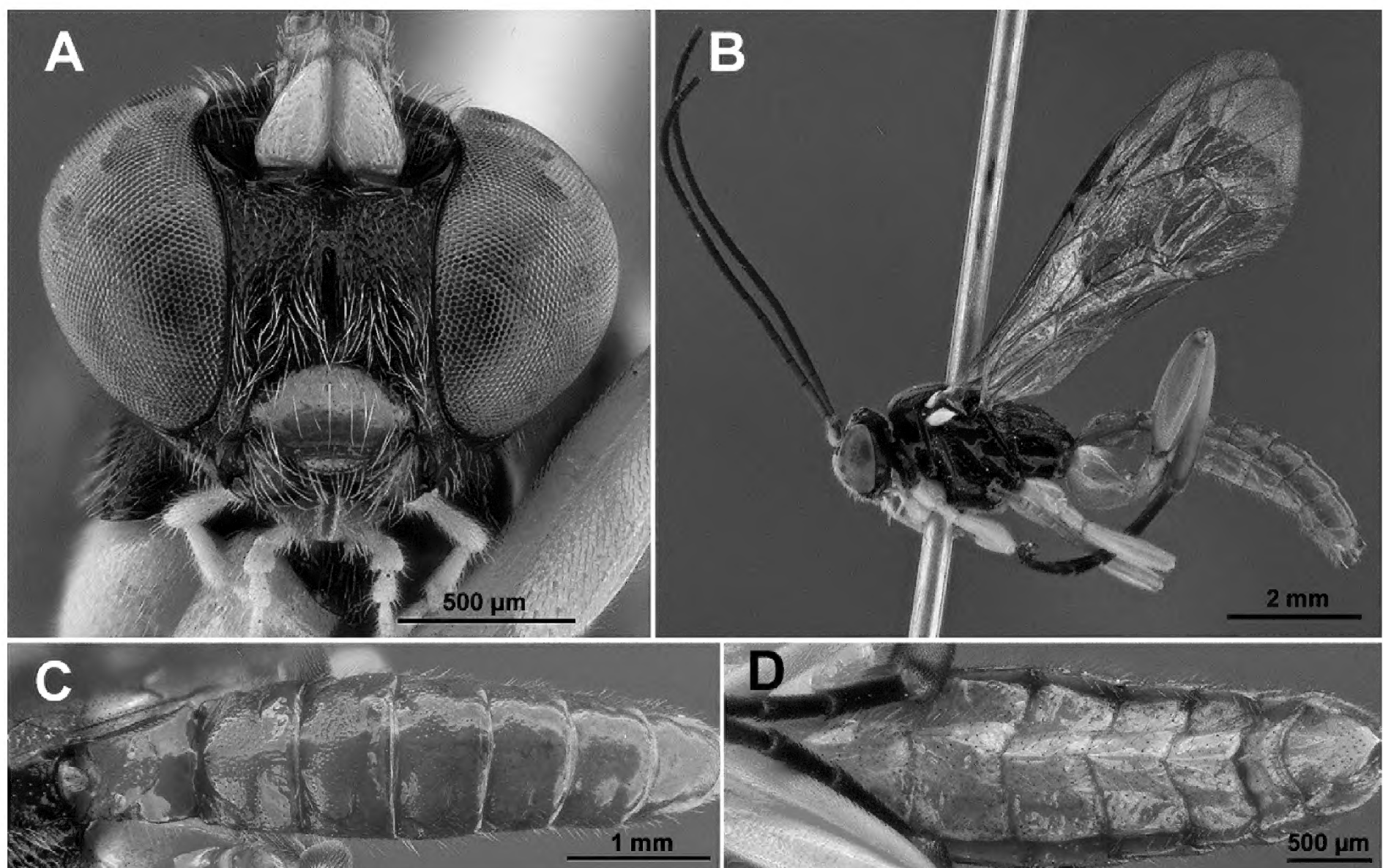


Figure 1. *Pimpla croceiventris* (Cresson, 1868), male. **A.** Head, frontal view. **B.** Habitus, lateral view. **C.** Metasoma, dorsal view. **D.** Metasoma, ventral view.

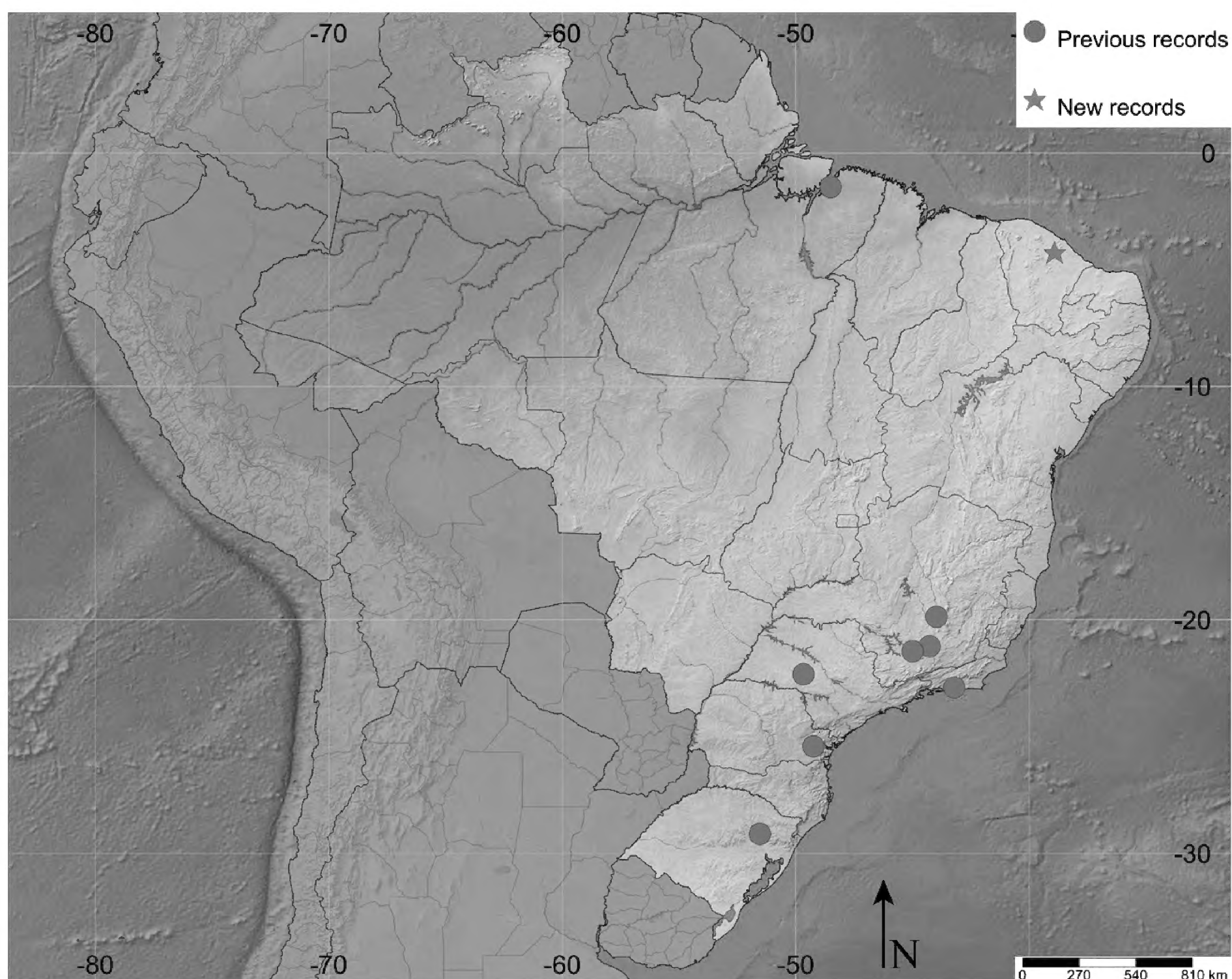


Figure 2. Distribution records of *Pimpla croceiventris* (Cresson, 1868).

Pimpla golbachii (Porter, 1970)

Figure 3A–D

Material examined. BRAZIL • 4 ♂♂; Bahia, Encruzilhada; 15°32'25"S, 040°50'12"W; 10–12 Dec. 2007; Malaise trap; J.A. Rafael, P.C. Grossi and D.R. Parizotto leg.; INPA, codes CL0005–CL0009. • 1 ♀; Bahia, Jequié, Módulo de Odontologia, UESB - Campus II; 13°49'54.8"S, 040°04'30.1"W; 25 Nov. 2006; Malaise trap; F.P. Alves leg.; INPA, code CL00010 • 1 ♂; idem, but 25 May 2007; INPA, code CL00011 [without head] • 1 ♂, 2 ♀♀; idem, but Distrito de Irrigação da Fazenda Velha, Agroecossistemas, 13°52'51.9"S, 040°10'42.6"W; 25 Nov. 2006; INPA, codes CL00012–CL00014 • 2 ♂♂, 1 ♀; idem, but 20 Dec. 2006; INPA, codes CL00015–CL00017 • 1 ♂; idem, but Borda do Pasto; 13°86'18.6"S [sic!], 040°15'79.5"W; J.T. Santos leg.; INPA, code CL00018. • 3 ♂♂, 1 ♀; Rio Grande do Norte, Patu, Serra do Lima, Sítio Miranda; 06°06'18"S, 037°37'41"W; Oct. 2008; Malaise trap; D.R.R. Fernandes et al. leg.; INPA, codes CL00019–CL00022 • 1 ♀; idem, but Nov. 2008; INPA, code CL00023.

Identification. According to Porter (1970) this species can be identified by the combination of the following characteristics: 1) wings hyaline; 2) mesosoma black with hind corners of meso and metapleuron brown

and tegula white; 3) metasoma reddish; 4) laterotergite V 1.3 times as long as wide; 5) legs reddish, except for fore coxa often becoming more or less broadly blackish based, hind tibia with sometimes a little dusky staining, especially near apex, and tarsi usually duller with often a little dusky staining on the apical segment; 6) tergite II shining and almost uniformly large, deep, adjacent to reticulately confluent punctures, except narrowly smooth on apex; 7) malar space 0.8–1.0 (0.6–0.9 in the male) times as long as basal width of mandibles; and 8) female with ovipositor cylindric, upper valve apex without teeth and dorsal valve with teeth gently convex on the tip.

Distribution. Argentina, Bolivia, Brazil, Colombia, Paraguay, and Uruguay (Yu et al. 2016).

Distribution in Brazil. Minas Gerais, São Paulo, Paraná, Santa Catarina (Fernandes et al. 2020), Bahia and Rio Grande do Norte (new records, Northeast Region) (Fig. 4).

Pimpla sumichrasti (Cresson, 1874)

Figure 5A–D

Material examined. BRAZIL • 1 ♂; Ceará, Guaramiranga; 04°15'47.0"S, 038°54'47.0"W; Nov. 2018; Malaise trap; J.F. Sobczak leg.; INPA, code CL00024 • 5 ♀♀; Bahia, Ruy Barbosa, Serra do Orobó, Riacho da Pratinha; 12°18'58.1"S, 040°29'28.5"W; 10 Nov. 2015; F.

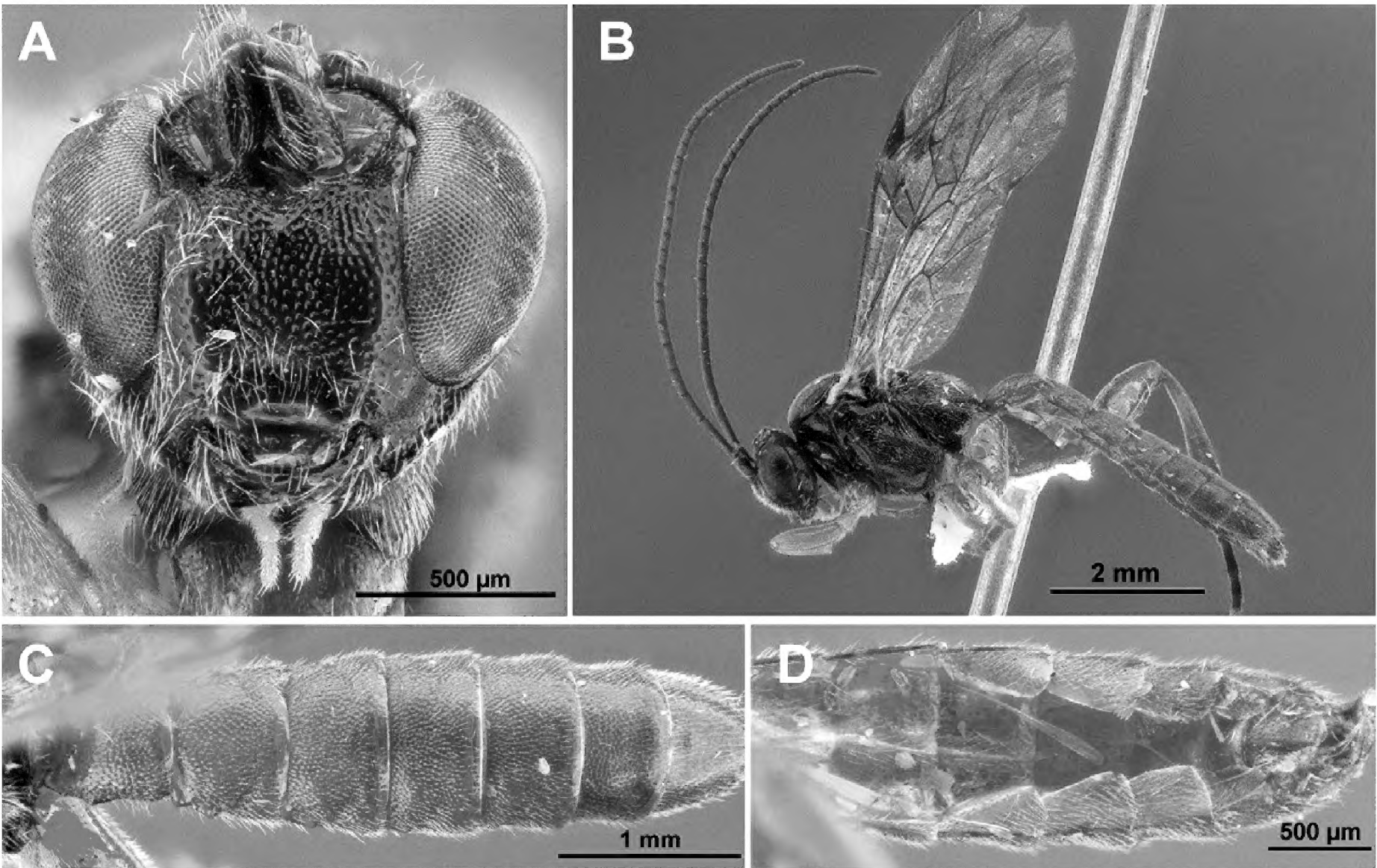


Figure 3. *Pimpla golbachii* (Porter, 1970), male. **A.** Head, frontal view. **B.** Habitus, lateral view. **C.** Metasoma, dorsal view. **D.** Metasoma, ventral view.

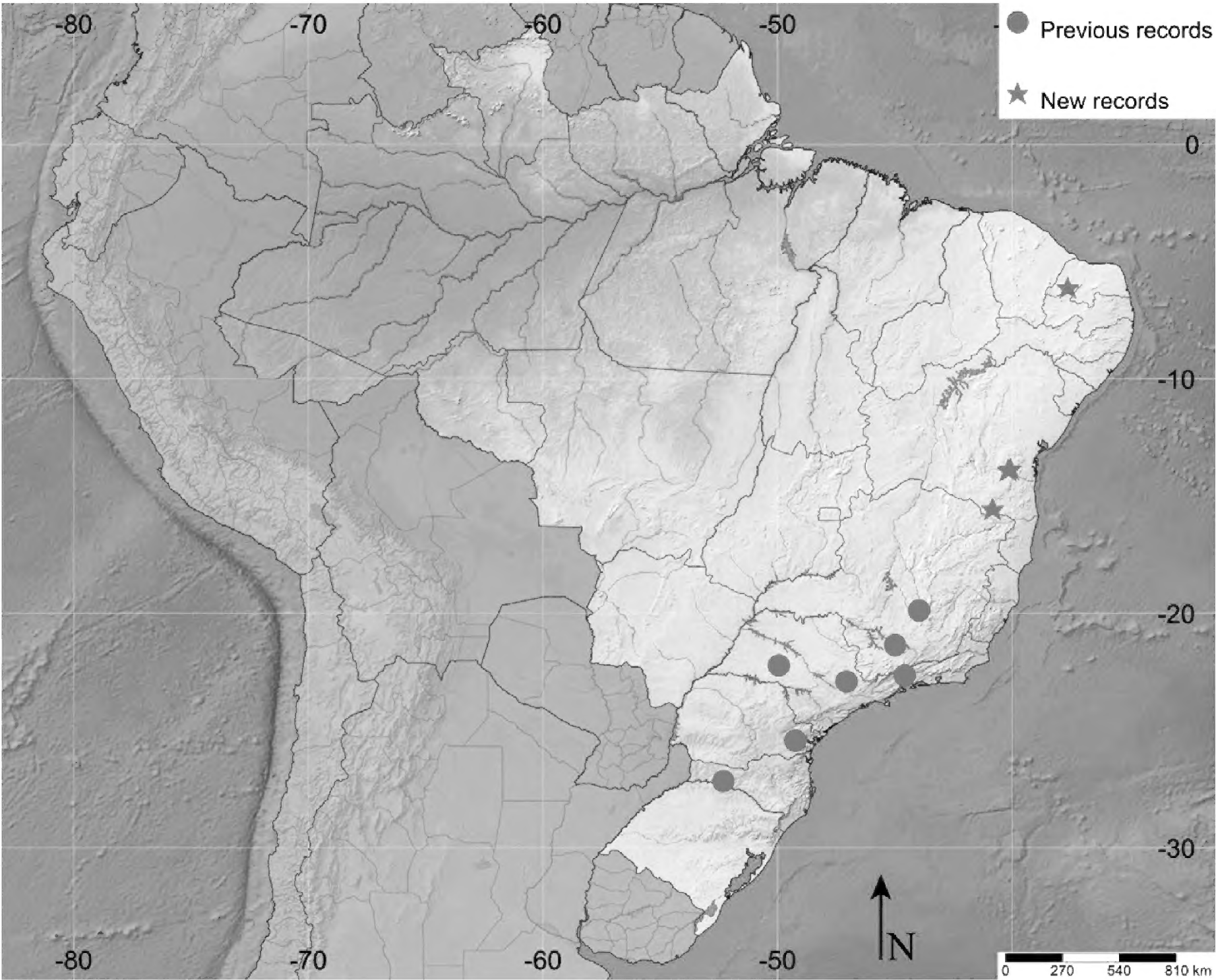


Figure 4. Distribution records of *Pimpla golbachii* (Porter, 1970).

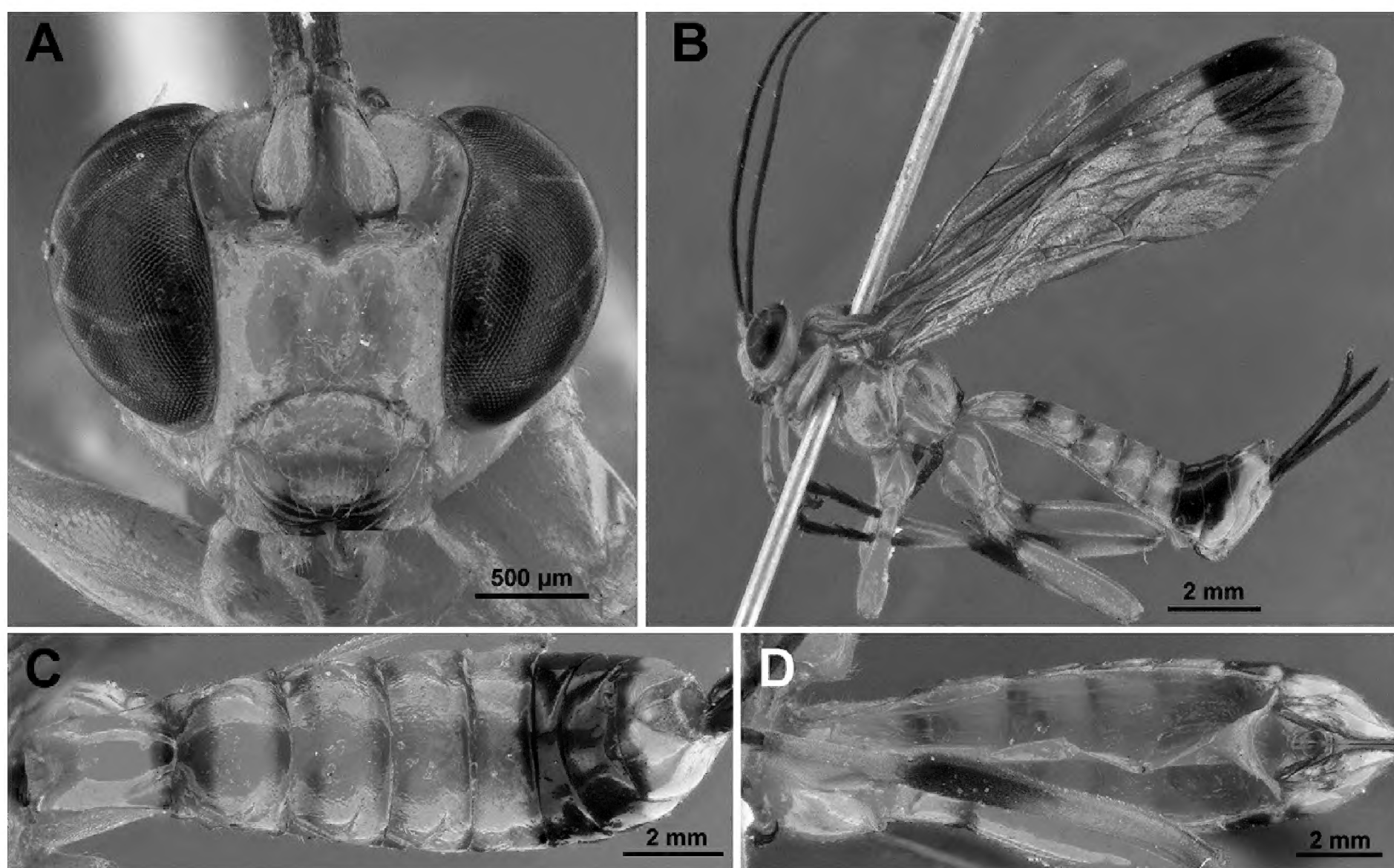


Figure 5. *Pimpla sumichrasti* Cresson, 1874, female. **A.** Head, frontal view. **B.** Habitus, lateral view. **C.** Metasoma, dorsal view. **D.** Metasoma, ventral view.

Bravo et al. leg.; UEFS, codes CL00025–CL00029.

Identification. According to Porter (1970), this species is characterized by: 1) head bright to rather dull yellow with black marks and mesosoma predominantly yellow or orange, sometimes with black marks; 2) malar space narrow, less than 0.60–0.75 times as long as basal mandibular width; 3) mesoscutum yellow with three longitudinal black stripes; 4) fore wing with an apical black spot and with Rs strongly sinuous; 5) metasoma with laterotergites V narrow, less than 0.3 times as broad as long; 6) tergite I rather slender, in profile evenly convex; 7) tergites VI–VII almost entirely black; and 8) female with ovipositor apically slightly flattened, with upper valve bearing weak lateral denticles and with lower valve simple, not enclosing the upper.

Distribution. Argentina, Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Paraguay, Peru and Venezuela (Yu et al. 2016; Pádua et al. 2019).

Distribution in Brazil. Minas Gerais, Paraná, Santa Catarina, São Paulo (Fernandes et al. 2020), Bahia and Ceará (new records, Northeast Region) (Fig. 6).

Discussion

Pimpla croceiventris, *P. golbachii*, and *P. sumichrasti* have a restricted distribution to tropical and subtropical regions (Fernandes et al. 2020). In Brazil, these species have been recorded in the south and southeast of Brazil, except for *P. croceiventris*, which has also been recorded in the north of the country (Fernandes et al. 2020). With

the new records, the geographic range of these species are extended to the Northeast Region of Brazil. However, more targeted sampling is needed to fully understand the actual distribution of these species since the current paper provides new records only from limited areas of the Brazil (Kumagai 2002; Kumagai and Graf 2002; Pádua and Nunes 2017).

Pimpla is one of the most studied ichneumonids regarding the development of larvae and the physiological characteristics (Rojas-Rousse and Benoit 1977; Quicke 2015). Also, in some studies, species of *Pimpla* are used in biological control, which is quite uncommon for idiobiont species of relatively large size (Iwata 1950; Minamikawa and Momoi 1964; Quicke 2015; Yu et al. 2016). This makes this genus of interest and the new knowledge generated about its distribution will further contribute to the understanding of physiological tolerances in different habitats, as well as to the discovery of new parasitoid-host interactions in new environments.

Regarding parasitoid-host interactions, perhaps the *P. golbachii* species is one of the most well-known, being parasitoid of Gelechiidae: *Pectinophora gossypiella* (Saunders, 1844); Noctuidae: *Alabama argilacea* Hübner, 1823 (Porter 1970); Pieridae: *Colias lesbia* Fabricius, 1775 (Avalos et al. 2011); Pyralidae: *Diaphania hyalinata* Linnaeus, 1767; Tortricidae: *Rhyacionia buoliana* (Denis & Schiffermüller, 1775) (Porter 1970). In the case of the species *P. croceiventris*, it is parasitoid of the moth *Cryptoblabes gnidiella* (Millière, 1864) (Lepidoptera: Pyralidae) (Bisotto-de-Oliveira et al. 2007), and the host of *P. sumichrasti* species is unknown (Yu et al. 2016).

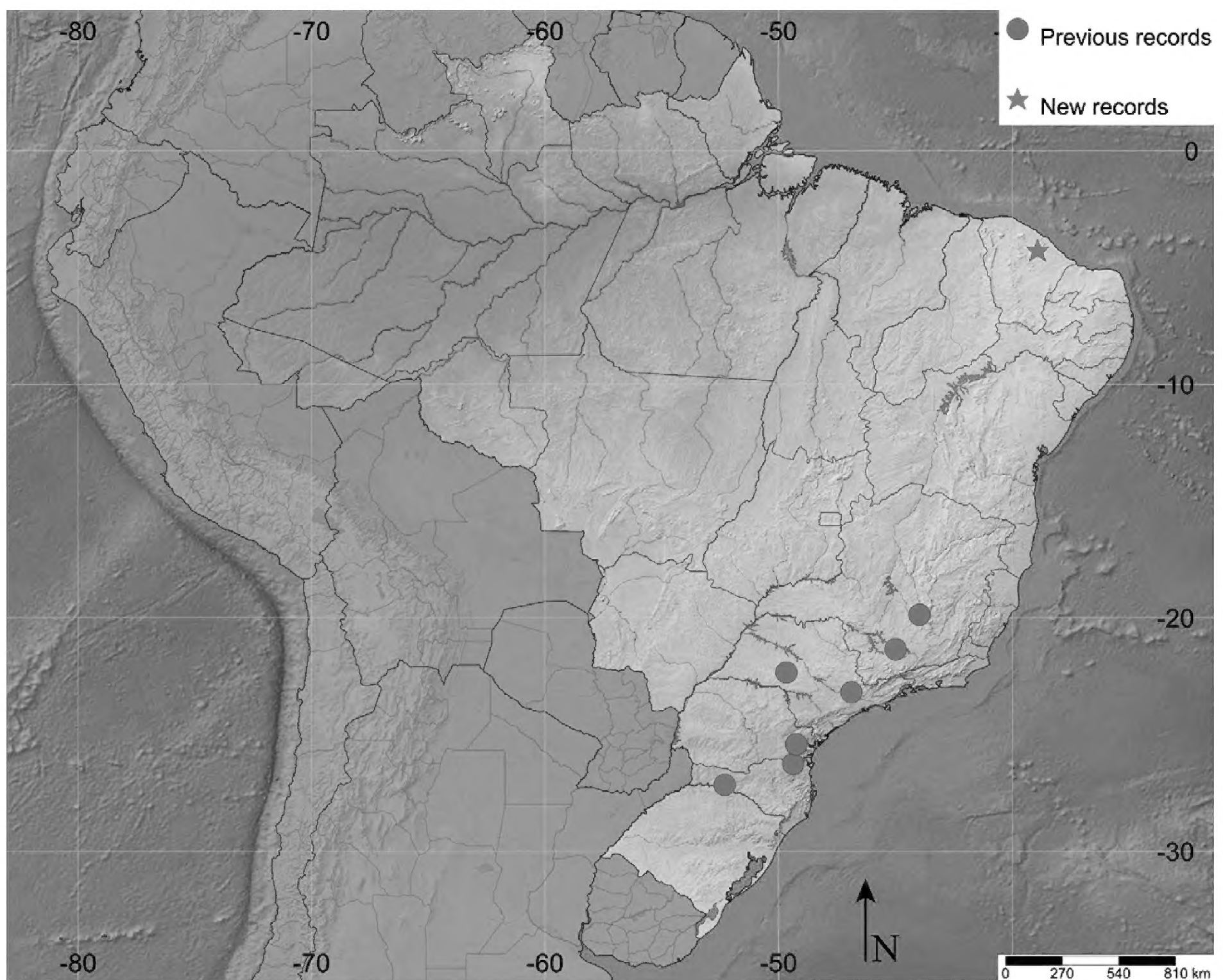


Figure 6. Distribution records of *Pimpla sumichrasti* Cresson, 1874.

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Authors' Contributions

JFS collected and identified the specimens. DGP photographed, identified the specimens and produced the map. GAVB wrote the manuscript and produced the plates. All authors discussed the results and contributed to the final version of the manuscript.

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